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(54) **IMAGE FORMING APPARATUS**

(71) Applicant: **KYOCERA Document Solutions Inc.**,
Osaka (JP)

(72) Inventors: **Shinichi Kawaguchi**, Osaka (JP);
Hiroshi Yokota, Osaka (JP)

(73) Assignee: **KYOCERA Document Solutions Inc.**,
Osaka (JP)

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CPC **B41J 2/16526** (2013.01); **B41J 2/1652**
(2013.01); **B41J 2/16552** (2013.01); **B41J**
2/16579 (2013.01)

(58) **Field of Classification Search**

CPC .. B41J 2/16526; B41J 2/1652; B41J 2/16552;
B41J 2/16579
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Primary Examiner — Justin Seo

(74) *Attorney, Agent, or Firm* — LEX IP MEISTER,
PLLC

(57) **ABSTRACT**

A conveying belt has a plurality of flushing openings and a detection hole, and the plurality of flushing openings are arranged in at least two rows along the main scanning direction. Furthermore, the discharge timing controller (a) detects a position of the detection hole in the main scanning direction with a belt sensor, (b) identifies the flushing opening corresponding to the nozzle based on the position of the detected detection hole in the main scanning direction, and (c) causes the print engine to perform flushing of the nozzle at a timing corresponding to the flushing opening.

4 Claims, 9 Drawing Sheets

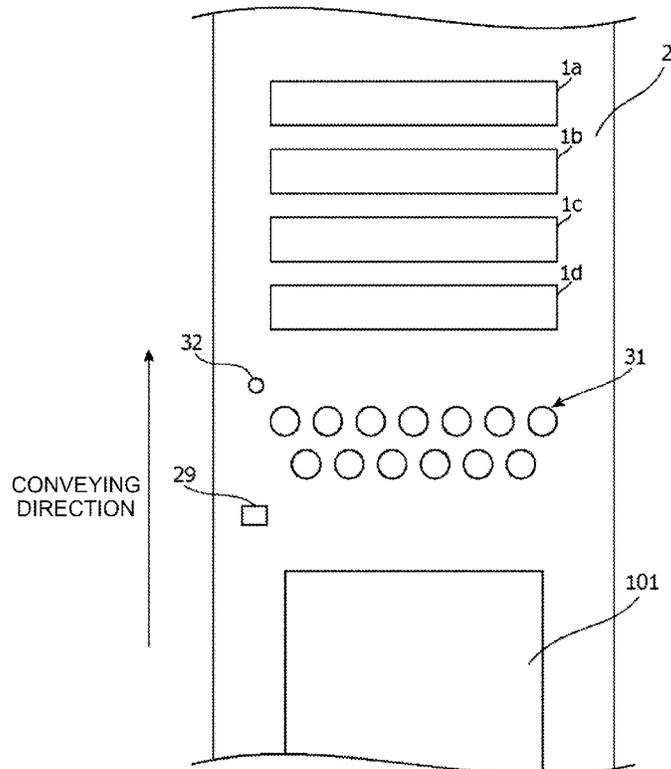


FIG. 2

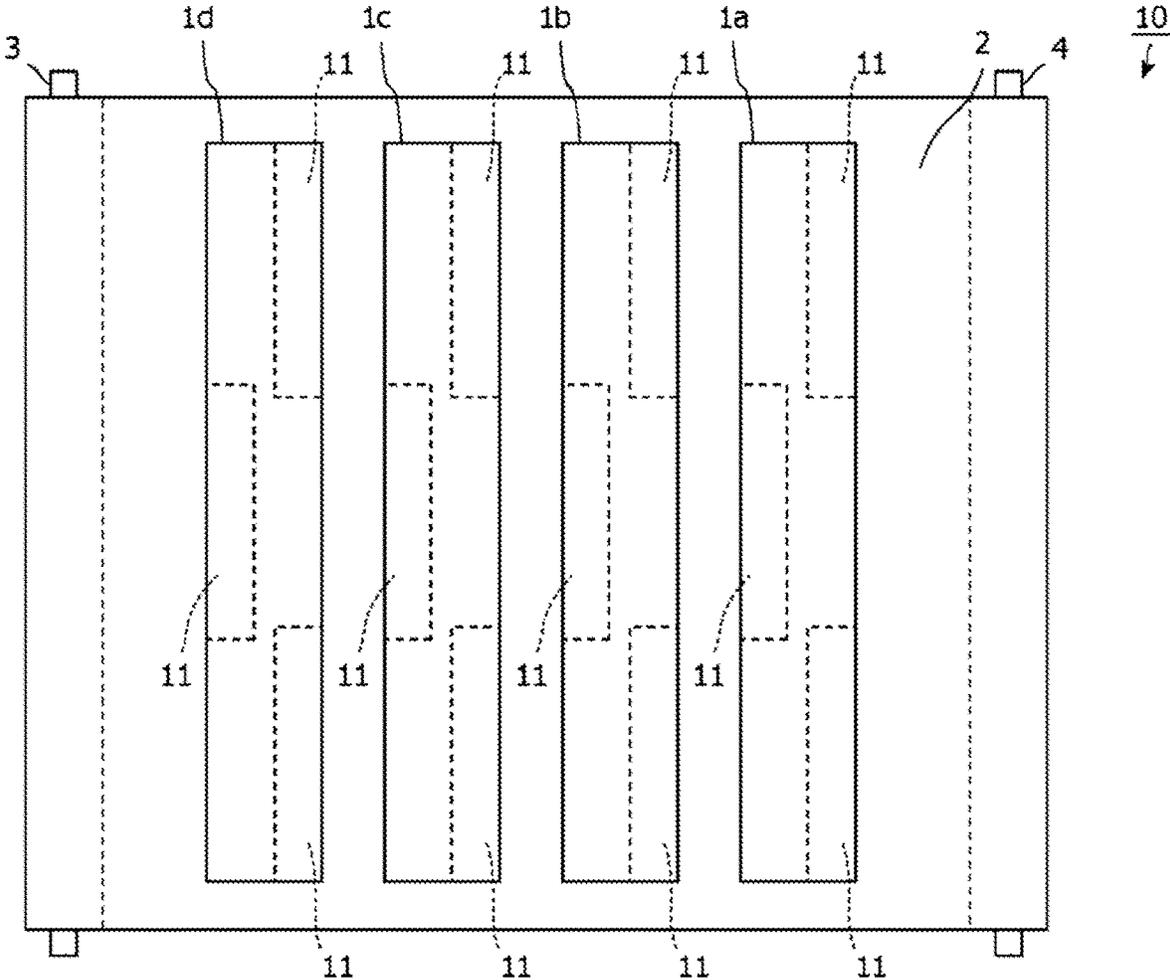


FIG. 3

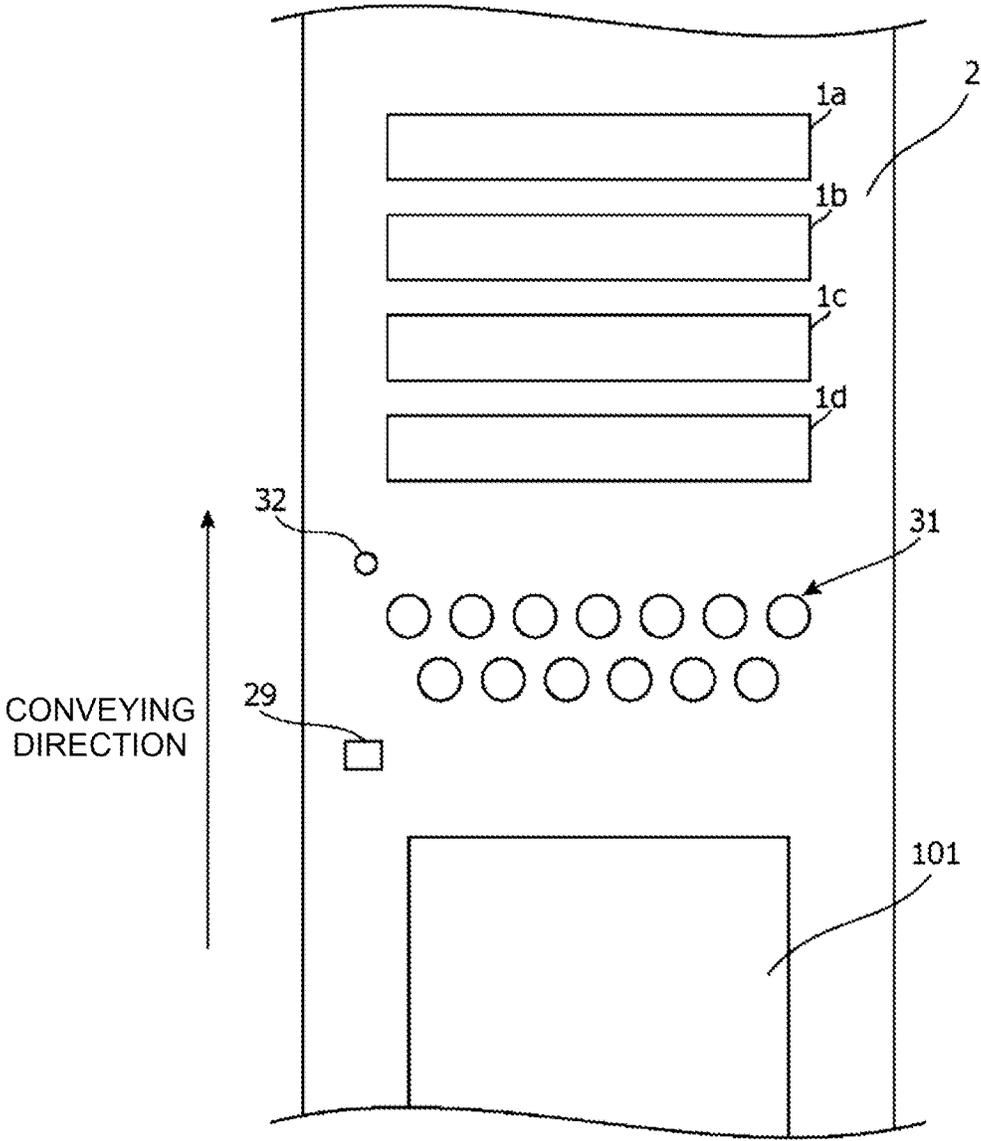


FIG. 4

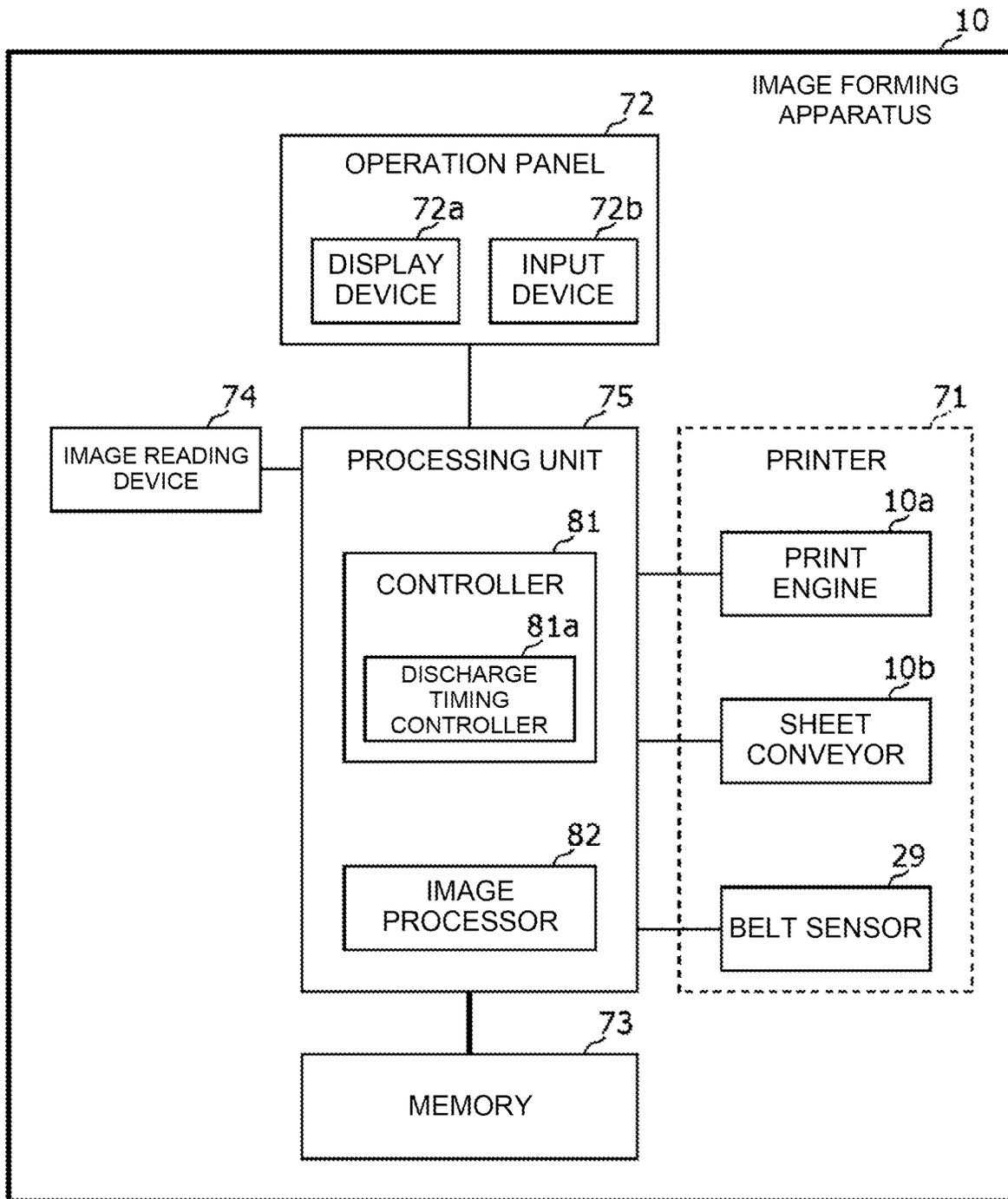


FIG. 5

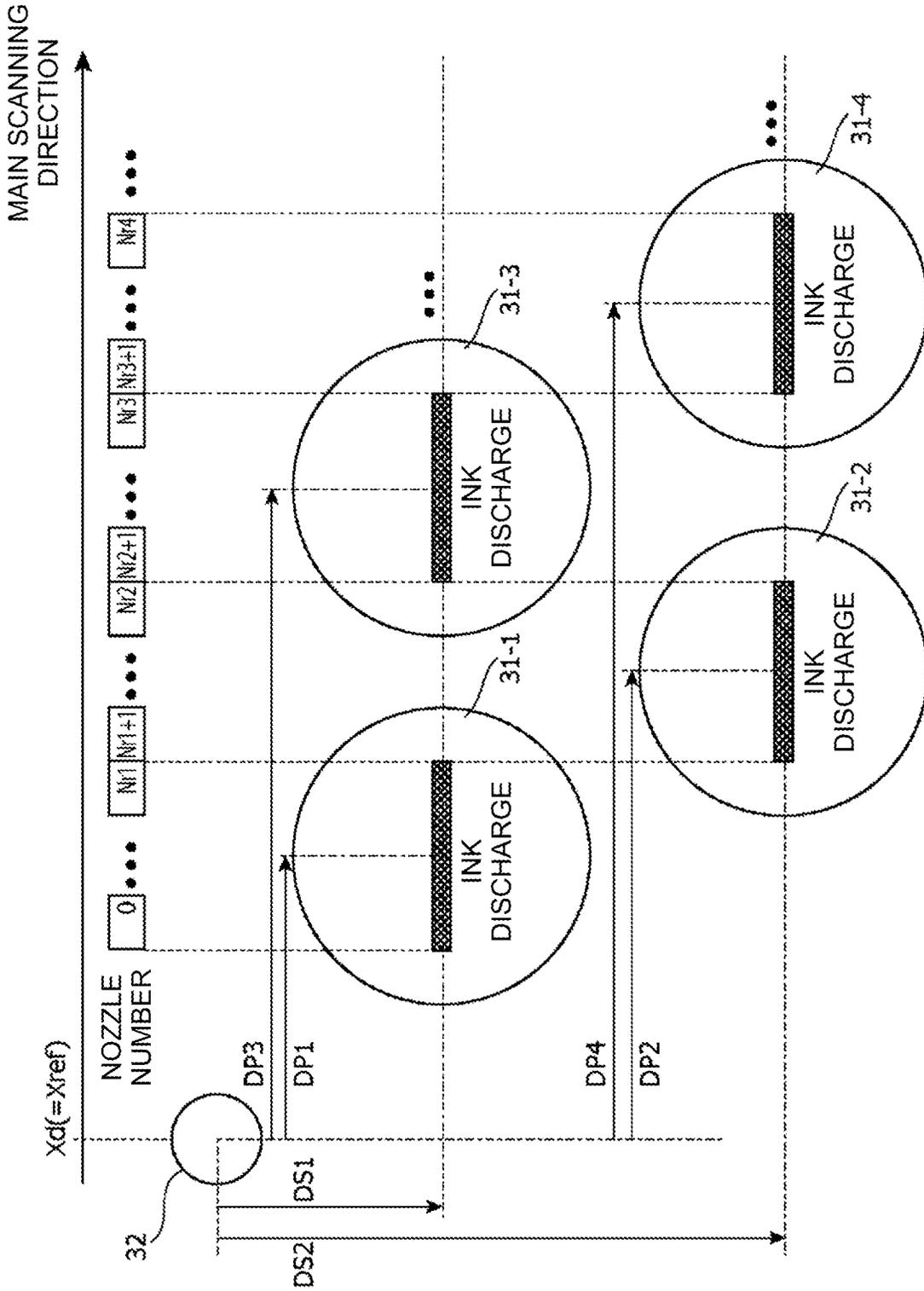


FIG. 6

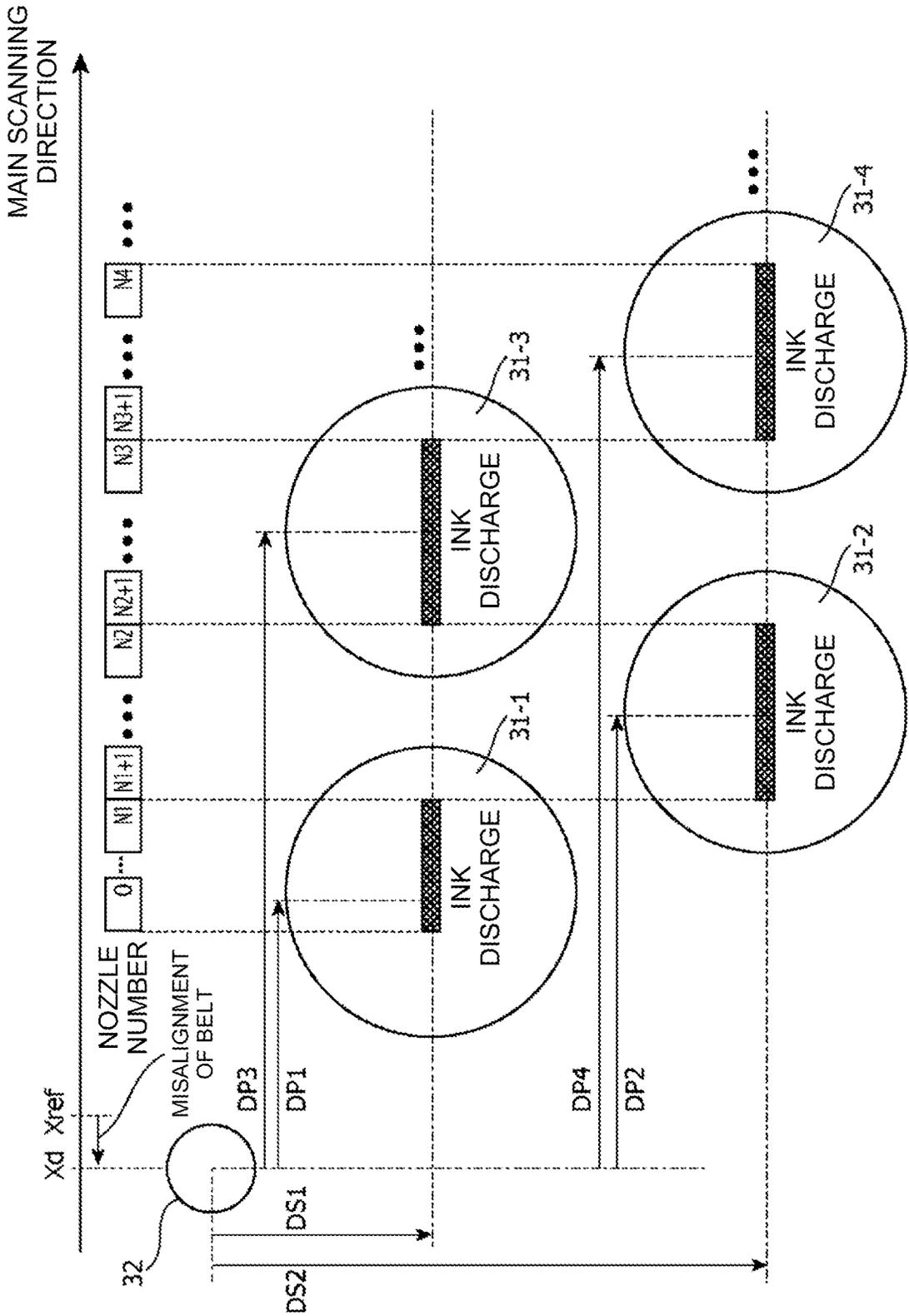


FIG. 7

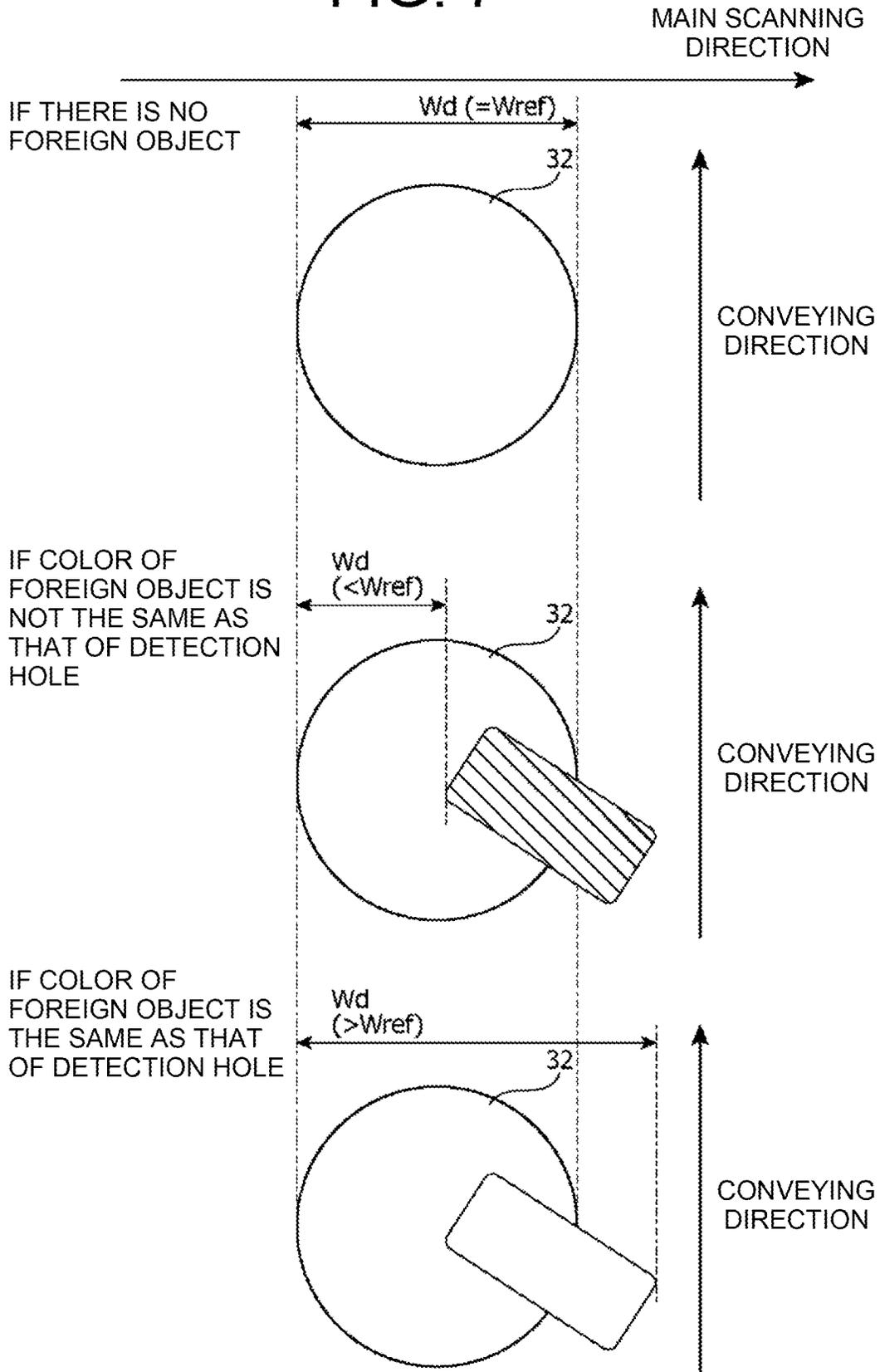
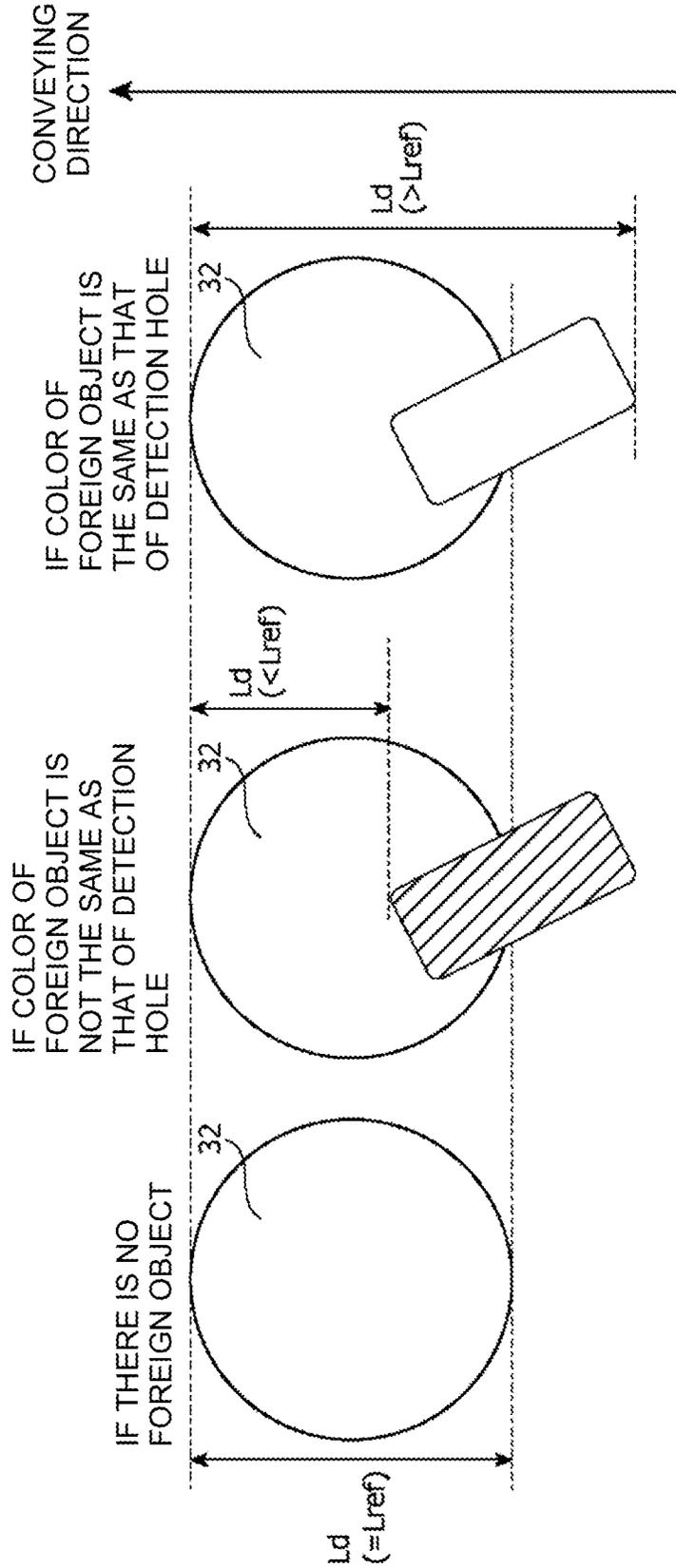


FIG. 8



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IMAGE FORMING APPARATUS

INCORPORATION BY REFERENCE

This application is based upon, and claims the benefit of
 priority from, corresponding Japanese Patent Application
 No. 2022-016961 filed in the Japan Patent Office on Feb. 7,
 2022, the entire contents of which are incorporated herein by
 reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present disclosure relates to an image forming appa-
 ratus.

Description of Related Art

In inkjet recording devices such as inkjet printers, drying
 ink tends to clog nozzles of recording heads thereof due to
 thickening of ink. Therefore, flushing is performed to dis-
 charge and discard the thickened ink. In some image form-
 ing apparatus, holes corresponding to the size of a unit
 recording head in the recording heads are provided on the
 conveying belt, and ink is discharged through the holes to
 perform flushing.

There is a case where, during a circulating movement of
 the conveying belt, the conveying belt is misaligned in the
 main scanning direction (perpendicular to the conveying
 direction and along the width direction of the conveying
 belt). If the conveying belt is being misaligned in the main
 scanning direction, ink discharged by flushing may not be
 accurately discarded downward through the above men-
 tioned holes and hit the conveying belt, it results in possible
 contamination of it.

The present disclosure was made in view of the above
 circumstances, and an object of the present disclosure is to
 obtain an image forming apparatus capable of properly
 performing flushing even if the conveying belt is misaligned
 in the main scanning direction when flushing is performed
 through flushing openings formed on the conveying belt.

SUMMARY OF THE INVENTION

An image forming apparatus according to the present
 disclosure includes: a conveying belt to convey a print sheet;
 a print engine including a plurality of nozzles arranged in a
 main scanning direction to discharge ink from the nozzles
 onto the print sheet; and a discharge timing controller to
 control an ink discharge timing of the print engine. The
 conveying belt may have a plurality of flushing openings
 and a detection hole, and the plurality of flushing openings
 may be arranged in at least two rows along the main
 scanning direction. The discharge timing controller may (a)
 detect a position of the detection hole in the main scanning
 direction with a sensor, (b) identify the flushing opening
 corresponding to the nozzle based on the position of the
 detected detection hole in the main scanning direction, and
 (c) cause the print engine to perform flushing of the nozzle
 at a timing corresponding to the flushing opening.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a side view illustrating an internal mechani-
 cal configuration of an image forming apparatus according
 to an embodiment of the present disclosure,

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FIG. 2 is a plan view of the image forming apparatus
 shown in FIG. 1,

FIG. 3 is a diagram illustrating an example of a conveying
 belt 2 in FIG. 1,

FIG. 4 is a block diagram illustrating an electric configu-
 ration of the image forming apparatus according to the
 embodiment of the present disclosure,

FIG. 5 is a diagram explaining identification of flushing
 openings corresponding to each nozzle, which continues to
 FIG. 6 (1/2),

FIG. 6 is a diagram explaining identification of flushing
 openings corresponding to each nozzle (2/2),

FIG. 7 is a diagram explaining determination of whether
 or not flushing is performed based on a width of a detection
 hole in a main scanning direction according to a second
 embodiment,

FIG. 8 is a diagram explaining determination of whether
 or not flushing is performed based on a length of a detection
 hole in a conveying direction according to a second embodi-
 ment, and

FIG. 9 is a diagram illustrating a detection range of the
 detection hole according to a third embodiment.

DETAILED DESCRIPTION

Hereinafter, embodiments according to the present dis-
 closure will be explained with reference to drawings.

First Embodiment

FIG. 1 shows a side view illustrating an internal mechani-
 cal configuration of an image forming apparatus according
 to an embodiment of the present disclosure. FIG. 2 shows a
 plan view of an image forming apparatus illustrated in FIG.
 1.

The image forming apparatus 10 according to the present
 embodiment is an apparatus such as a printer, copier, fac-
 simile machine, multifunction machine, and in the present
 embodiment it has a line-head-type inkjet color printing
 mechanism.

The image forming apparatus 10 shown in FIG. 1 has a
 print engine 10a and a sheet conveyor 10b. The print engine
 10a physically prints an image to be printed onto a print
 sheet (e.g., paper for printing). An ink cartridge is detachable
 to/from the print engine 10a, and the print engine 10a
 performs print using ink supplied from ink cartridge. The
 sheet conveyor 10b conveys the print sheet to the print
 engine 10a.

In the present embodiment, the print engine 10a has a
 line-head-type inkjet recording parts 1a-1d corresponding to
 four ink colors which are cyan, magenta, yellow, and black,
 and inkjet recording parts 1a-1d discharge ink onto the print
 sheet.

As shown in FIG. 2, in the present embodiment, each of
 inkjet recording parts 1a, 1b, 1c, and 1d has one or more
 (here three) head sections 11. Those head sections 11 are
 arranged along the main scanning direction so as to be
 detachable to/from the apparatus body. The head section 11
 (i.e., each of inkjet recording parts 1a, 1b, 1c, and 1d) has a
 plurality of nozzles arranged in the main scanning direction
 and discharges ink from the nozzles onto the print sheet.

In the present embodiment, the sheet conveyor 10b has a
 conveying belt 2 positioned facing the print engine 10a and
 conveys a print sheet, a drive roller 3, a driven roller 4, and
 a tension roller 4a on which the conveying belt 2 is sus-

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pended, a suction roller **5** nipping the print sheet together with the conveying belt **2**, a rear conveying belt **6**, and a dryer **7**.

The drive roller **3**, driven roller **4**, and tension roller **4a** circulate the conveying belt **2**. The suction roller **5** nips the print sheet conveyed from a paper feeding cassette **20** described below, and the nipped print sheet **101** is conveyed in turn by the conveying belt **2** to print positions of inkjet recording parts **1a** to **1d**, on which respective color images are printed by inkjet recording parts **1a** to **1d**. At this time, a sheet sensor **2a** detects passage of the print sheet, and a current position of the print sheet on a convey path is identified based on the detection timing, thereby printing the image at an appropriate position on the print sheet. Then, the print sheet which has been printed is ejected by the rear conveying belt **6** to the ejection tray **10c**, etc. At this time, the print sheet on which ink has been discharged is dried by the dryer **7**.

FIG. **3** shows an example of the conveying belt **2** shown in FIG. **1**. The conveying belt **2** has a plurality of flushing openings **31**. For example, as shown in FIG. **3**, a plurality of flushing openings **31** are formed in the conveying belt **2**, and the flushing openings **31** are arranged in at least two rows (two rows in FIG. **3**) along the main scanning direction. In other words, there are flushing openings **31** which are located at different positions from each other in the conveying direction. The plurality of flushing openings **31** are arranged so as to cover the entire range of the plurality of nozzles arranged in inkjet recording parts **1a** to **1d** in the main scanning direction (i.e., so that there is no flushing opening that does not correspond to the nozzle).

Sheet suction holes are arranged uniformly in a specific density in areas other than the flushing openings **31**.

For example, as shown in FIG. **1**, ink receiving parts **8a** to **8d** are provided below the head sections **11** of the inkjet recording parts **1a** to **1d**, respectively. Flushing (e.g., line flushing) for each of the nozzles in each of inkjet recording parts **1a**, **1b**, **1c**, and **1d** is performed when any of the flushing openings **31** is positioned directly below any of the head sections **11** of inkjet recording parts **1a**, **1b**, **1c**, and **1d**, and ink discharged from the nozzles during flushing is received by the corresponding ink receiving parts **8a**, **8b**, **8c**, and **8d** through the flushing openings **31** and collected into a waste ink tank.

In addition, the sheet suction parts **9** are arranged along a sheet conveying path in areas other than the ink receiving parts **8a** to **8d**. Negative pressure is applied to the sheet suction parts **9**, thereby sucking the print sheet onto the conveying belt **2** through the sheet suction holes. A lower negative pressure than the sheet suction parts **9** is applied to the ink receiving parts **8a** to **8d**.

Furthermore, the sheet conveyor **10b** has a paper feeding cassette **20** as a paper feed source. The paper feeding cassette **20** accommodates print sheets **101**, and a lifting plate **21** pushes the print sheets **101** upward to bring it into contact with a pickup roller **22**. The print sheets **101** mounted on the paper feeding cassette **20** are picked up by the pickup roller **22** and fed to a paper feeding roller **23** one by one from the top of the bunch of the print sheets **101**. The paper feeding roller **23** conveys the print sheets **101** fed by the pickup roller **22** from the paper feeding cassette **20** on the conveying path one by one.

The conveying roller **27** conveys the print sheet **101** on a specific conveying path. When a print sheet **101** being conveyed is detected by the resist sensor **28a**, a resist roller **28** pauses the print sheet **101** and conveys the print sheet **101** to the print engine **10a** (specifically, to a nip position

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between the suction roller **5** and the conveying belt **2**) at a secondary paper feeding timing. The secondary paper feeding timing is designated by a controller **81** described below so that an image is formed at the designated position on that print sheet **101**.

In addition, a belt sensor **29** is provided above the conveying belt **2**. The belt sensor **29** is an optical sensor such as a line sensor positioned along the main scanning direction, for example, detects reflected light obtained by irradiating light onto the conveying belt **2** by an LED, etc. with each light receiving element such as a photodiode, and identifies the color at each position within a specific range in the main scanning direction.

Furthermore, the conveying belt **2** has a detection hole **32**. The detection hole **32** is formed in order to detect the position (misalignment amount) of the conveying belt **2** in the main scanning direction, as described below. In the conveying direction, the detection hole **32** is located before a leading flushing opening **31**.

The detection hole **32** (image thereof) is detected by the belt sensor **29** in a different color than the surface of the conveying belt **2** (image thereof), and the position (misalignment amount) of the conveying belt **2** in the main scanning direction is identified based on the position of the detection hole **32** (image thereof).

As shown in FIG. **3**, for example, the width of inkjet recording parts **1a**, **1b**, **1c**, and **1d** (i.e., the width of the nozzle arrangement) is more than that of the print sheet **101**, and the width of arrangement of the flushing openings **31** is more than that of inkjet recording parts **1a**, **1b**, **1c**, and **1d**.

FIG. **4** shows a block diagram illustrating an electric configuration of the image forming apparatus **10** according to the embodiment of the present disclosure. As shown in FIG. **4**, in addition to the print apparatus **71**, which has the mechanical configuration shown in FIGS. **1** and **2**, the image forming apparatus **10** further has an operation panel **72**, a storage device **73**, an image reading device **74**, and a processing unit **75**.

The operation panel **72** is located on the surface of a chassis of the image forming apparatus **10** and has a display device **72a** such as a liquid crystal display, and an input device **72b** such as a hard key and a touch panel, in which the display device **72a** displays various messages to the user and the input device **72b** accepts user's operation.

The storage device **73** is a nonvolatile memory such as a flash memory, a hard disk drive, etc. to store data, programs, etc. necessary for controlling the image forming apparatus **10**.

The image reading device **74** has a platen glass and an automatic document feeder, and optically reads out an image of a document placed on the platen glass or being conveyed by the automatic document feeder, and generates image data of the image.

The processing unit **75** includes a computer which operates in accordance with a program, an ASIC (Application Specific Integrated Circuit) or the like which performs a specific operation, and operates as sorts of processors. The computer includes a CPU (Central Processing Unit), a ROM (Read Only Memory), a RAM (Random Access Memory) and the like, and operates as sorts of processors (together with ASIC where necessary) by loading a program into the RAM from the ROM, the storage device **73** or the like and executing the programs by the CPU.

Here, the processing unit **75** operates as the controller **81** and the image processor **82**.

The controller **81** controls the print apparatus **71** (print engine **10a**, sheet conveyor **10b**, etc.) and executes print jobs

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requested by the user. In the present embodiment, the controller **81** causes the image processor **82** to perform a specific image process and controls print engine **10a** (head section **11**) to discharge ink to form a print image on the print sheet. The image processor **82** performs a specific image

process, such as RIP (Raster Image Processing), color conversion, and halftoning, over the image data of an image to be printed on the print sheet. The controller **81** causes the print apparatus **71** to print out the image designated by the user. Specifically, the controller **81** causes the print engine **10a** to print out a user's document image based on print image data designated by the user. The controller **81** causes the print engine **10a** to discharge ink when printing the user's document image.

Furthermore, the controller **81** has a discharge timing controller **81a** to control an ink discharge timing of the print engine **10a**. The discharge timing controller **81a** causes the print engine **10a** to discharge ink from each nozzle at the flushing timing corresponding to each nozzle of the print engine **10a**. This flushing is performed in order to discard ink thickened in the nozzle.

FIGS. **5** and **6** are diagrams illustrating the identification of the flushing openings **31** corresponding to each nozzle.

The discharge timing controller **81a** (a) detects a position X_d (center position of the detection hole **32**) of the detection hole **32** in the main scanning direction with a belt sensor **29**, (b) identifies the flushing opening $31-i$ ($i=1, 2, \dots, N_f$; N_f is the number of the flushing openings **31**) corresponding to each nozzle (nozzle number= $0, \dots, N_n$; N_n is a nozzle number) based on the position X_d of the detected detection hole **32** in the main scanning direction, and (c) causes the print engine **10a** to perform flushing of the nozzle at a timing corresponding to the flushing opening $31-i$.

Specifically, the discharge timing controller **81a** (a) identifies the flushing opening $31-i$ corresponding to the nozzle based on the position X_d of the detection hole **32** in the main scanning direction, the distance DP_i from the detection hole **32** to the flushing opening $31-i$ (the center position of the flushing opening $31-i$), the width of the flushing opening $31-i$ (here, the radius of a circular flushing opening $31-i$) and the position of the nozzle in the main scanning direction, (b) identifies the discharge timing for flushing of the nozzle (=detection timing of detection hole $32+DS_j$ /linear velocity) based on the detection timing of the detection hole **32**, the distance DS_j ($j=1, 2$) from the detection hole **32** to the identified flushing opening $31-i$ in the conveying direction and the linear velocity of conveying belt **2**, and (c) causes the print engine **10a** to execute the flushing of the nozzle at the identified discharge timing. As a result, flushing of the nozzle is performed at the timing when the identified flushing opening $31-i$ arrives at the position directly below the corresponding nozzle.

FIG. **5** shows the case where there is no misalignment of the conveying belt **2** in the main scanning direction. In the case shown in FIG. **5**, the position X_d of the detection hole **32** is the reference position X_{ref} , the flushing opening $31-1$ corresponds to the nozzles whose nozzle numbers are 0 to Nr_1 , and the flushing opening $31-2$ corresponds to the nozzles whose nozzle numbers are Nr_1+1 to Nr_2 (similar rule can be applied to the flushing openings $31-3$ to $31-N_f$).

On the other hand, FIG. **6** shows the case where there is the misalignment of the conveying belt **2** in the main scanning direction. In the case shown in FIG. **6**, the position X_d of the detection hole **32** is different from the reference position X_{ref} , so that the flushing opening $31-1$ corresponds to the nozzles whose nozzle numbers are 0 to N_1 ($N_1 \neq Nr_1$) and the flushing opening $31-2$ corresponds to the nozzles

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whose nozzle numbers are N_1+1 to N_2 ($N_2 \neq Nr_2$) (similar rule can be applied to the flushing openings $31-3$ to $31-N_f$).

In this way, the misalignment of the conveying belt **2** is detected by the detection holes **32**, so that the nozzles corresponding to each flushing opening $31-i$ are identified by the misalignment being taken into account.

The nozzles (nozzle numbers) corresponding to each flushing opening **31** are individually identified for each inkjet recording part $1a-1d$ (i.e., for each ink color).

Next, the operation of the above mentioned image forming apparatus **10** will be explained below.

When printing an image, the discharge timing controller **81a** controls the print engine **10a** to discharge ink from the nozzles of inkjet recording parts **1a**, **1b**, **1c**, **1d** onto the print sheet at ink discharging timing for the pixels in which ink is discharged in the image.

The discharge timing controller **81a** performs flushing according to specific flushing conditions (such as a lapse of a specific non-use time of the image forming apparatus **10A**). At that time, the discharge timing controller **81a** selects the nozzles (some or all nozzles) to be flushed and performs flushing for the selected nozzles. Specifically, when the conveying belt **2** is circulating, when the detection hole **32** is detected by the belt sensor **29**, the discharge timing controller **81a** identifies the position of the detection hole **32** in the main scanning direction based on the image obtained by the belt sensor **29**, identifies the flushing opening $31-i$ corresponding to the selected nozzles, and identifies the flushing timing for each selected nozzles based on the relative position of the identified flushing opening $31-i$ relative to the detection hole **32**, and so on. When the flushing timing arrives for each nozzle, the discharge timing controller **81a** discharges ink to perform flushing.

According to the first embodiment mentioned above, the conveying belt **2** has a plurality of flushing openings **31** and a detection hole **32**, and the plurality of flushing openings **31** are arranged in at least two rows along the main scanning direction. The discharge timing controller **81a** (a) detects the position of the detection hole **32** in the main scanning direction with the belt sensor **29**, (b) identifies the flushing opening **31** corresponding to the nozzles based on the position of the detection hole **32** in the main scanning direction, and (c) causes the print engine **10a** to execute flushing of the nozzles at the timing corresponding to the flushing opening **31**.

As a result, even if the conveying belt **2** is misaligned in the main scanning direction when flushing is performed through the flushing openings **31** formed in the conveying belt **2**, flushing is properly performed (without ink being discharged on the surface of the conveying belt **2**).

Second Embodiment

In a second embodiment, flushing is prohibited when the position (center position) of the detection hole **32** is not accurately identified due to foreign object (such as a piece of paper) adhering to the detection hole **32**.

In the second embodiment, the discharge timing controller **81a** (a) detects the size of the detection hole **32** (size based on the image obtained by the belt sensor **29**) with the belt sensor **29**, (b1) causes the print engine **10a** to perform flushing of the nozzles at a timing corresponding to the flushing opening $31-i$ if the detected size meets the specific reference value (that is, the difference (absolute value) between the detected size and the specific reference value is less than a specific value, and (b2) causes the print engine

10a not to perform flushing of the nozzles if the detected size does not meet the specific reference value.

FIG. 7 is a diagram illustrating the determination of whether or not flushing can be performed based on the width of the detection hole in the main scanning direction according to the second embodiment. FIG. 8 is a diagram illustrating the determination of whether or not flushing can be performed based on the length of the detection holes in the conveying direction according to the second embodiment.

The size of the detection hole 32 described above is, for example, the width Wd of the detection hole 32 in the main scanning direction as shown in FIG. 7, or the length Ld of the detection hole 32 in the conveying direction as shown in FIG. 8.

In the image obtained by the belt sensor 29, if the color of the detection hole 32 is not the same as that of the foreign object, the width Wd or length Ld of the detection hole 32 is detected to be smaller than the specific reference values Wref or Lref (width Wd and length Ld of the detection hole 32 in the absence of the foreign object), as shown in FIGS. 7 and 8, for example.

On the other hand, in the image obtained by the belt sensor 29, if the color of the detection hole 32 is the same as that of the foreign object, the width Wd or length Ld of the detection hole 32 is detected to be larger than the specific reference values Wref and Lref, as shown in FIGS. 7 and 8, for example.

Therefore, if the size of the detected detection hole 32 does not meet the specific reference value, the discharge timing controller 81a determines that foreign object (of the same or different color) is attached to the detection hole 32 and prohibits flushing since the position (center position) of the detection hole 32 is not accurately identified and the flushing opening 31-i corresponding to each nozzle to be flushed is not accurately identified.

As other configuration and operation of the image forming apparatus according to the second embodiment are identical or similar to those of the first embodiment, the explanations thereof are omitted here.

Third Embodiment

In a third embodiment, the period during which detection of detection holes 32 is attempted is limited so that foreign objects (such as a piece of paper) adhering to the conveying belt 2 are not erroneously detected as detection holes 32.

FIG. 9 is a diagram illustrating a detection range of the detection hole 32 according to the third embodiment.

Specifically, as shown in FIG. 9, for example, multiple sets of detection holes 32 and flushing openings 31 are formed on the conveying belt 2. The discharge timing controller 81a does not attempt to detect the detection hole 32 during a time period from a timing when the position of a certain detection hole 32 is detected by the belt sensor 29 to a timing when a detection range arrives, which is set for a timing after a detection cycle corresponding to a placement cycle HP of the detection holes 32, and attempts to detect the detection hole 32 in the detection range.

The placement cycle HP is the interval (distance) between the plurality of arranged detection holes 32, and the detection cycle is a time length obtained by dividing the placement cycle HP by a linear velocity of the conveying belt 2.

The temporal detection range corresponds spatially to a range DR of a distance R forward and a distance R backward from the position of the next detection hole 32, as shown in FIG. 9, for example. As detection of the detection hole 32 is not performed outside of the range DR, even if the foreign

object of the same color as the detection hole 32 adheres to a position outside of the range DR (substantially at the same position as the detection hole 32 in the main scanning direction) on the image, the foreign object is not erroneously detected as the detection hole 32, so that an inappropriate flushing can be prevented. If the foreign object adheres within the range DR, flushing may be prohibited as described in the second embodiment.

As other configuration and operation of the image forming apparatus according to the third embodiment are identical or similar to those of the first or second embodiment, the explanations thereof are omitted here.

It should be understood that various changes and modifications to the embodiments described herein will be apparent to those skilled in the art. Such changes and modifications may be made without departing from the spirit and scope of the present subject matter and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

For example, in the first to third embodiments mentioned above, instead of providing the above-mentioned detection holes 32 separately from the flushing openings 31, one of the leading flushing openings 31 in the conveying direction may be used as a detection hole.

Furthermore, in the first to third embodiments mentioned above, a line sensor (not shown) to detect the position of the print sheet 101 in the main scanning direction may be used as the belt sensor 29.

For example, the present disclosure can be applied to an inkjet based image forming apparatus.

What is claimed is:

1. An image forming apparatus comprising:

a conveying belt to convey a print sheet;
a print engine including a plurality of nozzles arranged in a main scanning direction to discharge ink from the nozzles onto the print sheet; and
a discharge timing controller to control an ink discharge timing of the print engine,

wherein

the conveying belt has a plurality of flushing openings and a detection hole,

the plurality of flushing openings are arranged in at least two rows along the main scanning direction,

the discharge timing controller (a) detects a position of the detection hole in the main scanning direction with a sensor, (b) identifies the flushing opening corresponding to the nozzle based on the position of the detected detection hole in the main scanning direction, and (c) causes the print engine to perform flushing of the nozzle at a timing corresponding to the flushing opening, and

the discharge timing controller (a) identifies the flushing openings corresponding to the nozzles based on the position of the detection hole in the main scanning direction, a distance from the detection hole to the flushing openings, and a position of the nozzle, (b) identifies the discharge timing for the flushing of the nozzle based on a detection timing of the detection hole, a distance from the detection hole to the identified flushing opening in a conveying direction and a linear velocity of the conveying belt, and (c) causes the print engine to perform the flushing of the nozzle at the identified discharge timing.

2. An image forming apparatus comprising:

a conveying belt to convey a print sheet;

a print engine including a plurality of nozzles arranged in a main scanning direction to discharge ink from the nozzles onto the print sheet; and
 a discharge timing controller to control an ink discharge timing of the print engine,
 wherein
 the conveying belt has a plurality of flushing openings and a detection hole,
 the plurality of flushing openings are arranged in at least two rows along the main scanning direction,
 the discharge timing controller (a) detects a position of the detection hole in the main scanning direction with a sensor, (b) identifies the flushing opening corresponding to the nozzle based on the position of the detected detection hole in the main scanning direction, and (c) causes the print engine to perform flushing of the nozzle at a timing corresponding to the flushing opening, and
 the discharge timing controller (a) detects a size of the detection hole with the sensor, (b1) if the detected size meets a specific reference value, causes the print engine to perform the flushing of the nozzle at a timing corresponding to the flushing opening, and (b2) if the detected size does not meet the specific reference value, does not cause the print engine to perform the flushing of the nozzle.
3. The image forming apparatus according to claim 2, wherein
 the size is a width of the detection hole in the main scanning direction or a length of the detection hole in the conveying direction.

4. An image forming apparatus comprising:
 a conveying belt to convey a print sheet;
 a print engine including a plurality of nozzles arranged in a main scanning direction to discharge ink from the nozzles onto the print sheet; and
 a discharge timing controller to control an ink discharge timing of the print engine,
 wherein
 the conveying belt has a plurality of flushing openings and a detection hole,
 the plurality of flushing openings are arranged in at least two rows along the main scanning direction
 the discharge timing controller (a) detects a position of the detection hole in the main scanning direction with a sensor, (b) identifies the flushing opening corresponding to the nozzle based on the position of the detected detection hole in the main scanning direction, and (c) causes the print engine to perform flushing of the nozzle at a timing corresponding to the flushing opening, and
 the discharge timing controller does not attempt to detect the detection hole during a time period from a timing when the position of the detection hole is detected to a timing when a detection range arrives that is set for a timing after a detection cycle corresponding to a placement cycle of the detection holes, and attempts to detect the detection hole in the detection range.

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